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**ADDITIONAL SAMPLING ACTIVITIES FOR
OPERABLE UNIT 2**

03-01-91

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ENCLOSURE

ADDITIONAL SAMPLING ACTIVITIES FOR OPERABLE UNIT 2

This work plan addendum presents an analysis of the current need for additional site characterization for Operable Unit 2 under the RI/FS. Operable Unit 2, Solid Waste Units, is comprised of five components: a Sanitary Landfill, an Inactive Fly Ash Disposal Area, an Active Fly Ash Pile, Lime Sludge Ponds; and the Southfield. This work plan addendum specifies the quantity and location of additional sampling locations and the type of analysis required. The justification for 18 soil borings is to adequately characterize the nature of contamination present and define the limits of the solid waste units within Operable Unit 2. Each solid waste unit was evaluated with data available from previous studies, primarily the CIS conducted by R. F. Weston (1986) and the present program. Additional sampling will increase the level of understanding of the volume, type, characteristics, and variability of the wastes. The specified analyses should be sufficient to characterize the source term for the geochemical modeling effort in support of the risk assessment for Operable Unit 2. This in turn increases the validity of the Risk Assessment and Feasibility Study.

Careful thought was given to placing the borings in order to minimize the number required while maximizing the usefulness of the information obtained. The locations were chosen due to the potential for the presence of contamination and to evaluate areas not characterized by previous borings. A summary of the sampling effort is outlined in Table 1. A detailed discussion and proposed sampling strategy is presented for each solid waste unit to be sampled.

SANITARY LANDFILL

Due to the heterogeneity of waste placed in the Sanitary Landfill, it is unreasonable to expect that any degree of sampling (short of excavation) would be sufficient to directly encounter all radiological and chemical constituents that may have been deposited in the landfill. Samples of the leachate from the wastes will provide an indicator of the migration of any soluble contaminants contained within the landfill. Soil samples will be taken from below the waste/till interface to determine if vertical migration of contamination from the landfill has occurred. It is proposed that five borings be completed within the landfill at locations shown on Figure 1. The landfill is composed of five excavated cells and an evaporation pond containing the disposed wastes. Two of the proposed boring locations are in the abandoned evaporation pond, where detectable concentrations of organics are expected to be found. One of the proposed borings is located in the vicinity of Weston CIS Borehole

TABLE 1
PROPOSED ADDITIONAL SAMPLING EFFORT, OPERABLE UNIT 2

Location	Number of Borings	Approximate Depth (ft)	Purpose	Sample Type	Number of Samples per Boring	Sample Parameters
Sanitary Landfill, Near Periphery	5	15-20	Sample waste; determine depth of landfill, sample leachate	Soil/waste	3	Full Rad/Extended HSL, Dioxins, Furans, TOC ^c , TCLP ^b
				Liquid/leachate	1	Extended HSL, Full RAD, General Groundwater ^c
Active Fly Ash Pile	4	15-20	Evaluate horizontal and vertical distribution and variability, sample leachate	Fly Ash/soil	3	Full RAD/Full HSL/TOC ^c , TCLP ^b , EP Tox
				Liquid/leachate	1 (if encountered)	Full HSL/Full RAD/General Groundwater ^c
Inactive Fly Ash Pile	4	25-35	As above	Fly Ash/soil	3	Full Rad/Full HSL, TOC ^c , TCLP ^b , EP Tox
				Liquid/leachate	1 (if encountered)	Full HSL/Full RAD/General Groundwater ^c
Lime Sludge Ponds	2	2	Sample lime sludge and standing water	Lime Sludge	1 (per pond)	TCLP ^b
				Standing Water	1 (per pond)	Full RAD/Full HSL, General Water Quality ^c
Southfield	4	2	Sample fill	Waste/soil	1	TCLP ^b

*Sampling to be conducted in compliance with Revision 3 of the Remedial Investigation and Feasibility Study Work Plan, Feed Materials Production Center Vol I, Sampling Plan, Sections 3.0 and 4.0, and Vol V, Quality Assurance Project Plan, Sections 5.0 and 6.0, March 1988.

^bA composite of borehole materials (excluding samples submitted for other analyses and those samples collected below the waste/till interface) from each boring drilled in the Sanitary Landfill and Flyash Piles will be subjected to a TCLP test, excluding volatile organics. TCLP VOCs will be analyzed on a specific interval sample from each of the specified borings. Lime Sludge Pond and Southfield samples will also undergo a TCLP test. A composite of each boring in the Fly Ash Piles and Southfield will be tested for the characteristics of reactivity, corrosivity and ignitability.

^cThese parameters, added to further characterize geochemical properties.

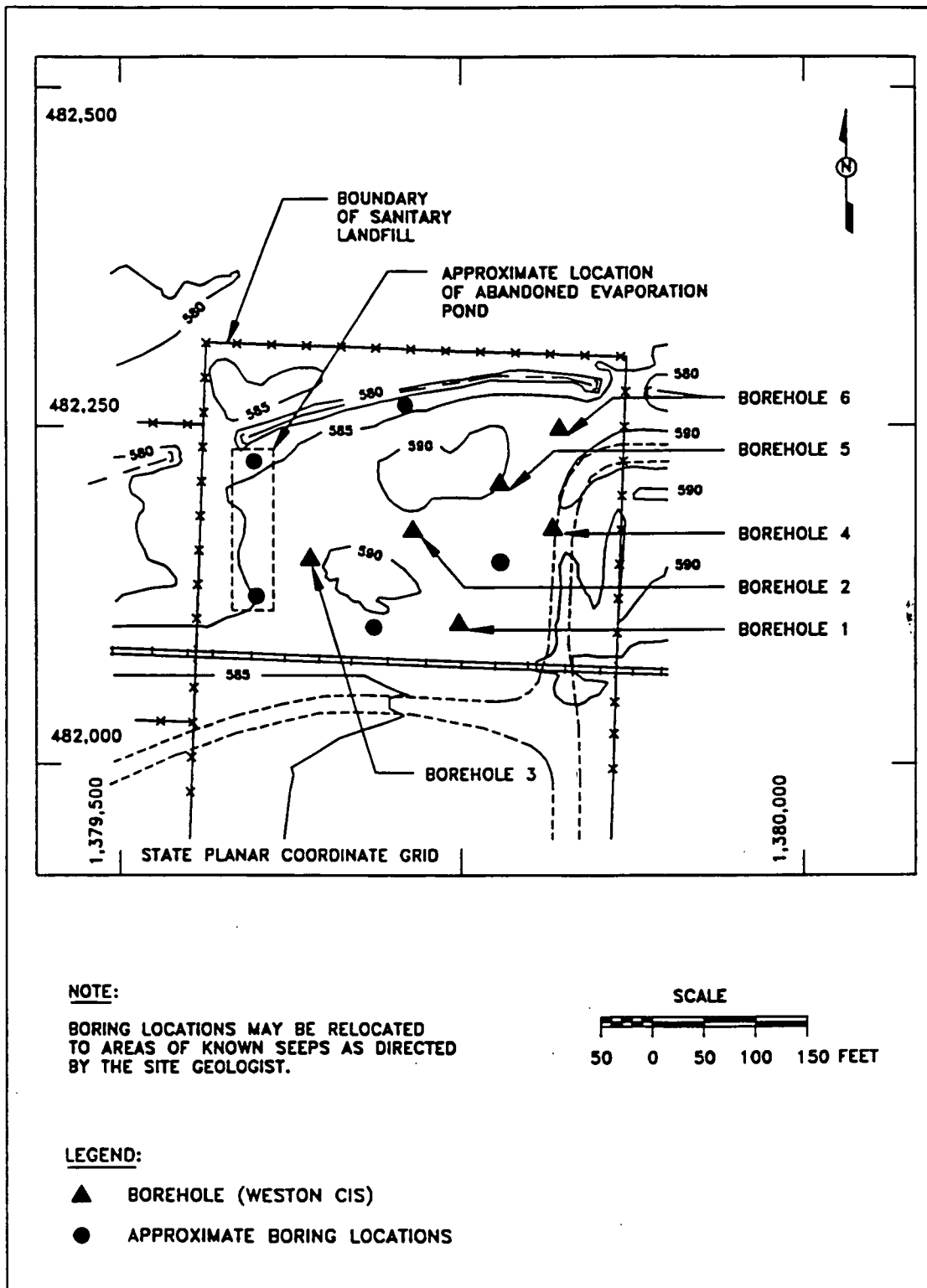


FIGURE 1. APPROXIMATE SAMPLING LOCATIONS, SANITARY LANDFILL

49-03, where high concentrations of radionuclides were detected. Two of the proposed borings will be located on the southern bank of the drainage channel to the north of the landfill. The potential exists for lateral transport of contaminants found in shallow subsurface landfill material through the southern bank of the drainage channel via seepage. In addition, boring locations in the Sanitary Landfill attempt to complete an even spatial distribution of sampling across the landfill.

Each boring will be continuously sampled as specified in the RI/FS Sampling Plan, Section 4.0, in order to provide sample for the required analyses and so that the materials encountered can be visually characterized. Sample material remaining after the submittal of the specified analyses will be archived for possible future analysis and treatability studies. RI/FS chain of custody protocols will be followed on the archived samples and they will be stored on-site in a secure, temperature controlled environment. At approximate intervals of five feet, or when field instruments detect the presence of radiological or organic constituents, samples will be collected and retained for full radiological, TOC, and extended HSL including PCBs, Dioxin, and Furans. Three soil samples, one from the shallow and one from the deeper portions of the landfill as well as a sample from below the waste/till interface will be analyzed from each borehole, as shown in Table 1. In addition, a composite sample of each boring (excluding samples collected below the waste/till interface) will be subjected to a TCLP test for metals, pesticides, and herbicides. TCLP volatile organics and semi-volatile organics will be analyzed on the sample above the waste/soil interface displaying the highest Hnu reading. If the Hnu screening does not show a preference a sample from near the mid point of each boring will be analyzed. Each boring should fully penetrate the landfill and be advanced approximately five feet past the waste/till interface. One of the samples obtained below the waste/till interface will be analyzed for full radiological, TOC, and extended HSL parameters, as shown in Table 1. This will determine if vertical migration of contaminants into the native soils below the landfill has occurred at the specified boring locations. Criteria for selection of sample to be analyzed will be field instrument readings. If no elevated readings are observed then the sample selected will be immediately below the waste/till interface.

Compositing will be completed as per the following guidelines. The samples to be composited will be divided lengthwise into two equal portions after each sample has been field screened for radioactivity and volatiles. Only one-half of each splitspoon core will be used for compositing. This will allow for specific interval analysis of the remaining uncomposited material. When volatile organic analysis of the sample is required, the necessary volume will be collected

immediately after dividing the sample. Nonmixable materials such as concrete, wood chips, paper, plastic, glass and rock fragments will be removed from the sample splits prior to compositing.

The compositing will be completed within a disposable glove bag. Samples will be placed in the bag after they have been split. Samples will not be removed from the glove bag until they have been composited and placed in appropriate containers. Only one composite will be prepared per bag. Splits of individual cores to be composited will be placed in pyrex or stainless steel bowl of sufficient volume to allow for thorough mixing and insure that sample spillage does not occur.

Mixing of the sample will be accomplished by one of two methods as follows:

- By hand, with a mixing tool composed of pyrex glass, stainless steel, or teflon.
- With a mechanical mixer utilizing stainless steel mixing blades.

A sample will be considered composited when uniform color and texture is observed throughout the sample. When uniformity has been achieved the composite will be spread evenly in the mixing bowl. The composite will then be quartered with equal portions taken from each quarter to provide the necessary volume of sample for the specified analysis. These portions will then be placed in the appropriate, labeled containers for shipment to the laboratory. Excess composite will be containerized and archived.

Compositing equipment will be decontaminated before/between each composite and rinsate samples will be collected as outlined in the RI/FS Work Plan, Volume V, Section 6.6, pgs. 26 and 27, dated March, 1988.

Four-inch stainless steel piezometers will be installed in all the boreholes as specified in the RI/FS QAPP, Section 5.0, if leachate or groundwater is present. The leachate or groundwater will be collected and analyzed for extended HSL parameters, including PCBs, dioxin and furans, as well as general groundwater and full radiological components, as shown in Table 1. Standard operating procedures (SOPs) for sampling equipment and procedures, sample handling, chain-of-custody and documentation will be as specified in the RI/FS QAPP, Section 5.0, 6.0, and 7.0.

If leachate/groundwater is not encountered in a particular boring the solids from that boring will be subjected to a Simulated Rainwater Leaching Procedure (SRLP). This procedure and

justification for it are detailed in Attachment 1. Sample volume for this procedure will be derived from splits of the composite sample and the specific interval sample that are designated for the TCLP analysis.

FLY ASH PILES

As part of the Weston CIS, two borings were placed within the Inactive Fly Ash Disposal Area and none were placed within the Active Fly Ash Pile. One composite sample per boring was analyzed for HSL pesticides/PCBs, HSL inorganics, and radiological constituents. Incremental depth profile samples from each borehole were also tested for U-238, Th-232, and Ra-226 to access the vertical distribution of these radionuclides. In order to more fully characterize the vertical and horizontal distribution of contaminants contained within each fly ash pile, four additional borings within the Inactive Fly Ash Disposal Area and four additional borings within the Active Fly Ash Pile are proposed. Figures 2 and 3, respectively, show the proposed locations.

Each boring will fully penetrate the fly ash and be advanced approximately five feet past the pile/till soil interface. All borings will be continuously sampled and samples submitted for analyses will be selected using protocols specified for the Sanitary Landfill borings. Sample material remaining after the submittal of the specified analyses will be archived as described in the previous section on the Sanitary Landfill borings. If a saturated zone is detected near the pile/till interface, piezometers will be installed as specified in section 5.0 of the RI/FS QAPP. The leachate or groundwater, if encountered, will be collected and analyzed for full HSL parameters including PCBs, as well as general groundwater, and full radiological components as shown in Table I. Solids samples from dry borings will be subjected to a Simulated Rainwater Leaching Procedure as described for the Sanitary Landfill borings.

The three discreet solid samples from each boring sent to the laboratory for analysis will be tested for a full suite of radionuclides, full HSL constituents, including PCBs and TOC. In addition, TCLP and EP Toxicity analyses will be performed on samples from each boring. The respective portions of the TCLP and EP Tox analyses (Herbicides, Pesticides, Metals, VOCs and Semi-VOCs) will be performed on Fly Ash samples consistent with the selection criteria described for the Sanitary Landfill TCLP samples. Boring composite samples will also be tested for characteristics of ignitability, corrosivity, and reactivity.

The geotechnical testing program will be conducted to provide physical data to be used for development of selected alternatives. During the drilling of two borings, one at each pile, Shelby tube samples will be collected. One sample from each borehole, at an approximate depth of 10 feet below grade, will be subjected to geotechnical testing specified in Table 2. The choice of borings to obtain samples from is arbitrary, and shall be determined in the field. The choice of the sample interval is based on an average representation of the strength parameters and index properties of the fly ash. All geotechnical sample analytical testing must be conducted as specified under the appropriate ASTM standards and laboratory procedures using qualified geotechnical technician(s) and properly calibrated apparatus which meet the intent of ASTM D3740-80. Documentation for the testing will conform to the standards set forth in the RI/FS, FMPC Quality Assurance Project Plan, QAPP, dated March, 1988.

LIME SLUDGE PONDS

Additional borings are required in both the North and South Lime Sludge Ponds to obtain samples for TCLP tests mandated by current regulations. Sufficient sample volume will be collected from each pond to perform the TCLP analysis and have a minimum of four kilograms of remaining material for treatability studies. This material will be archived in a manner consistent with that described for the archived material from the Sanitary Landfill borings. A hand auger will be used to collect these samples. Grab samples will be taken approximately two feet below the surface of each pond. In addition, one grab sample of standing water from each of the ponds will be obtained and analyzed for full HSL including PCBs, full radiological, and general water quality parameters. Sampling locations are arbitrary, and shall be determined in the field. Sampling protocols are as specified in Section 6.0 of the QAPP. Data obtained from this additional sampling, along with data available from previous investigation will sufficiently characterize the wastes in the Lime Sludge Ponds.

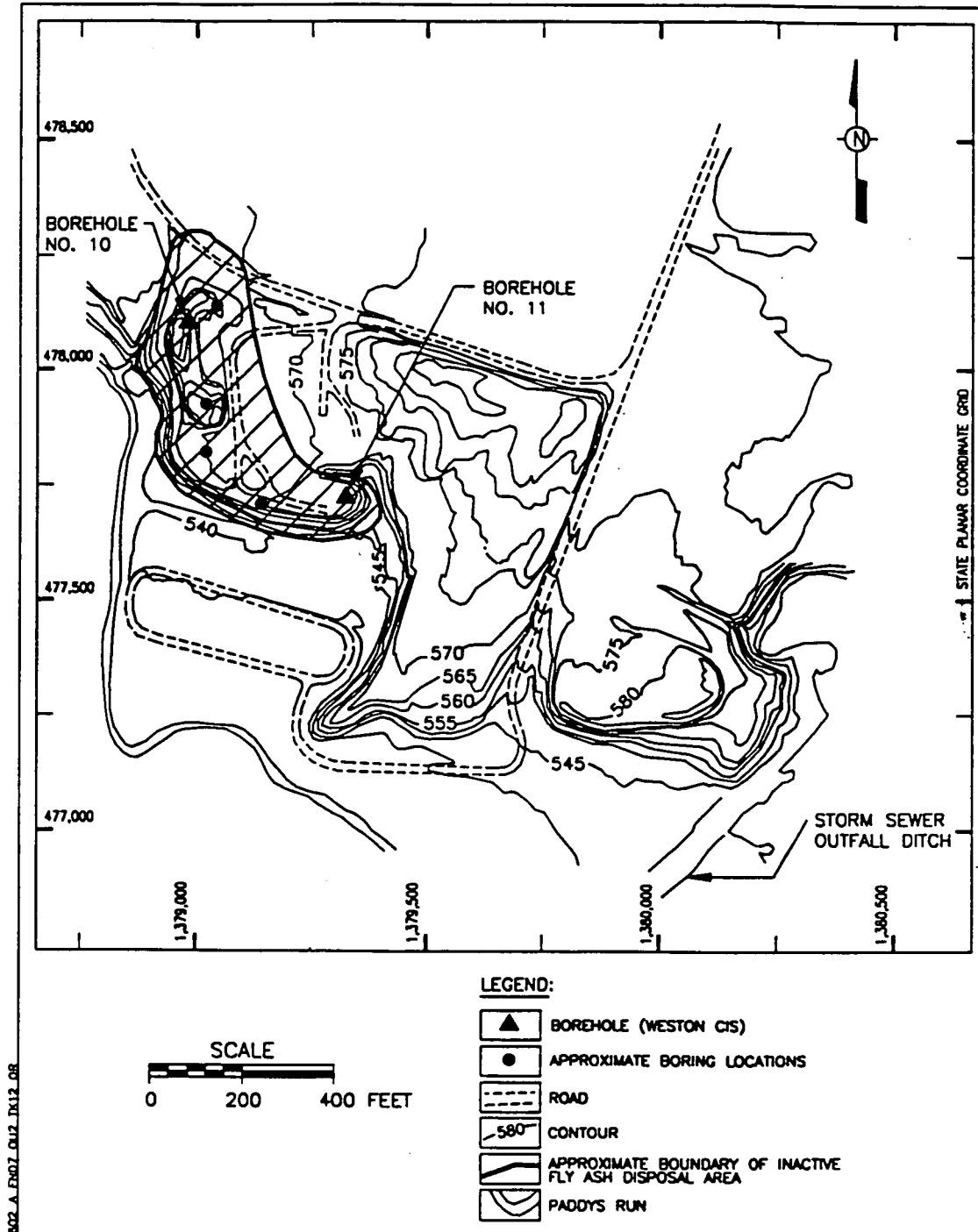


FIGURE 2. APPROXIMATE SAMPLING LOCATIONS, INACTIVE FLY ASH

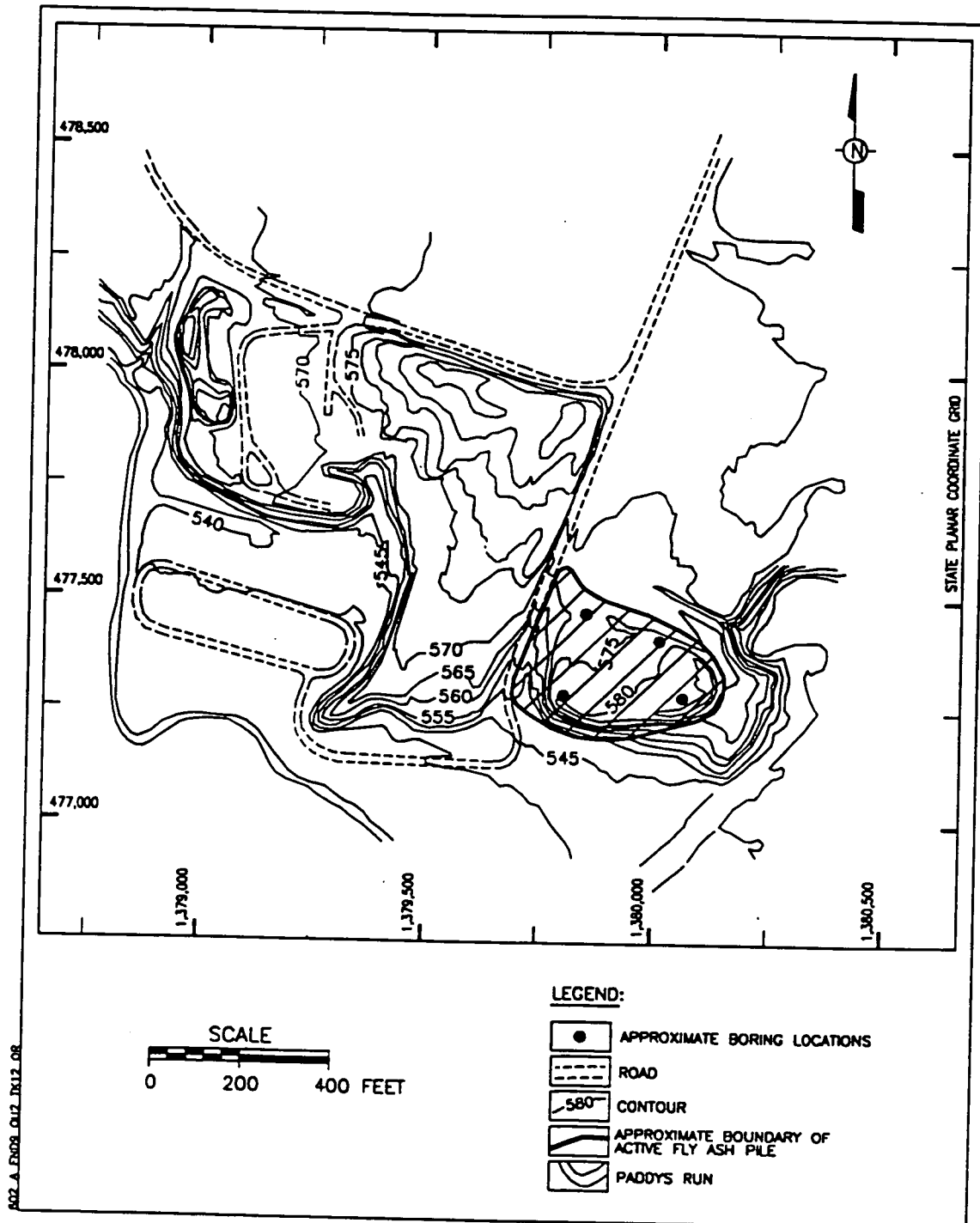


FIGURE 3. APPROXIMATE SAMPLING LOCATIONS, ACTIVE FLY ASH

TABLE 2
 PROPOSED GEOTECHNICAL TESTING PROGRAM FOR THE FLY ASH PILES^a
 PER SAMPLE

Test	Method
Grain Size/Hydrometer	ASTM D-422
Atterberg Limits	ASTM D-4318
Moisture Content	ASTM D-2216
Specific Gravity	ASTM D-854
Standard Proctor	ASTM D-698
Relative Density ^b	ASTM D-2049
1-D Consolidation	ASTM D-2435
Permeability	EPA Method 9100 (from SW-846)
In-Place Density	ASTM D-2922 or ASTM D-2167 or ASTM D-1556

^aOne additional test is required to determine the quantities of major chemical constituents contained in the fly ash. This test is ASTM C 311, "Sampling and Testing Fly Ash for Use as an Admixture in Portland Cement Concrete." This test should be performed on a sample from both the Active Fly Ash Pile and Inactive Fly Ash Disposal Area.

^bDue to the properties of fly ash, it is desirable to modify test apparatus to specifications outlined in the Electric Power Research Institute (EPRI) report EA-1281. This test will be completed as outlined in the report.

SOUTHFIELD

Additional borings are required to obtain samples for RCRA characteristic analysis (TCLP-toxicity, ignitability, corrosivity, reactivity). Four samples will be obtained for analysis. The field supervisor will determine the location of each sample such that each quadrant (northeast, northwest, etc.) of the Southfield is represented. These locations will be surveyed in order to document sampling locations. A hand auger will be used to drill each hole. Grab samples will be taken approximately two feet below the surface of the fill material. Sampling protocols are as specified in Section 6.0 of the QAPP. A minimum of four kilograms of material from each of the four locations will be archived as was discussed for the Sanitary Landfill borings. Results of this sampling in addition to data collected in the CIS, Environmental Baseline Survey, and RI/FS trenching will be adequate to characterize the waste in the Southfield.

ATTACHMENT 1
SIMULATED RAINWATER LEACHING PROCEDURE
FOR OPERABLE UNIT TWO
IN SUPPORT OF THE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO

Revised Draft

March 1991

1.0 INTRODUCTION

This analytical plan is designed to provide accurate and realistic concentrations of contaminants that may be leached from Operable Unit 2 (OU 2) waste material by infiltrating water. The Simulated Rainwater Leaching Procedure (SRLP), a modified form of the U.S. Environmental Protection Agency (EPA) Toxicity Characteristic Leaching Procedure (TCLP), will be performed on OU 2 waste samples if in situ leachate is not available. This analytical plan discusses the rationale for using the SRLP and provides the details of the analytical procedure. Data quality objectives are also provided.

Operable Unit 2 waste units include the sanitary landfill, inactive and active fly-ash piles, lime sludge ponds, and southfield area. Previous characterization of the materials present in the OU 2 waste units consists of the analysis of solids for metal and radionuclide concentrations; and EP Toxicity testing for metal concentrations (Weston, 1987). However, these data are insufficient to determine the composition of leachate accurately.

Glacial overburden, i.e., till and lacustrine deposits, overlies the glacial outwash sands and gravels of the Great Miami Aquifer throughout much of the FMPC site. However, in some areas, particularly along the western site boundary, surface water drainages have eroded through the till, exposing the aquifer (ASI/TT, 1990). A layer of glacial overburden separates the sanitary landfill and lime sludge pond wastes from the aquifer; however, parts of the fly-ash piles and southfield wastes are stored in direct contact with the aquifer sands and gravels (ASI/TT, 1990).

2.0 JUSTIFICATION FOR SIMULATED RAINWATER LEACHING PROCEDURE

The main difference between the TCLP and the SRLP is that the TCLP uses acetic acid as the extraction fluid, while the SRLP uses simulated rainwater. The most realistic scenario for the mobilization of contaminants from OU 2 waste units is by rainwater falling on the waste, leaching the waste constituents, and carrying contaminants into the groundwater system. With

the possible exception of the sanitary landfill, no large volumes of organic refuse are present in OU 2 waste units to generate organic acids.

The TCLP is not designed to provide leachate concentrations for input to contaminant fate and transport, and risk assessment models. The EPA developed the TCLP for the purpose of determining if solid waste possesses the characteristic of toxicity. Acetic acid was chosen by the EPA as the leaching solution to simulate the chemical environment of a municipal landfill, where acetic acid is generated by the microbial decomposition of organic refuse. The TCLP is thus a pass/fail test that is used for categorizing the solid waste as hazardous or nonhazardous as defined by the EPA.

Most heavy metals and radionuclides of potential concern at the FMPC have solubilities that are significantly higher under the acidic conditions imposed in the TCLP, compared to the conditions of the SRLP. In addition, the acetate anion, generated by the dissociation of acetic acid, is a complexing agent for several heavy metals, including Pb, Cu, and Zn. Thus, if more than enough heavy metals are present in the solid waste to saturate the leaching solution, then the TCLP will yield considerably higher metal concentrations than the SRLP. Thus, the SRLP must be used to obtain realistic estimates of the concentration of OU 2 contaminants of concern, if in situ leachate is not available.

3.0 DATA OBJECTIVES

Sampling and analysis of OU 2 waste material has resulted in the establishment of a comprehensive list of contaminants of concern, e.g., volatile organic compounds, toxic metals, and radionuclides, that must be addressed in the OU 2 baseline risk assessment (BRA). The fate and subsurface transport of the contaminants will be established as part of the OU 2 BRA. The objective of the laboratory SRLP presented here is to provide the OU 2 BRA with accurate and realistic leachate concentrations for fate and transport modeling. What follows in the remainder of this section is a general description of the need for and use of leachate concentrations derived from the SRLP.

The receptor location for groundwater ingestion is the top of Great Miami Aquifer, directly beneath or adjacent to the waste unit. This implies that the flow path for contaminants is primarily through the glacial overburden, if overburden is present. Modeling the transport of contaminants along this flow path requires initial contaminant concentrations, i.e., a source term. Sampling and analysis of in situ leachate is the preferred method of obtaining source-term data. However, if leachate is not present in all OU 2 waste units the SRLP is required to provide source-term data for these waste units. When the contaminant flow path is through glacial overburden, geochemical modeling will be used to assess precipitation/dissolution reactions between dissolved contaminants and the solid media. This modeling will be coupled with the fate and transport modeling to provide realistic contaminant concentrations at the receptor location.

Analytical results from the OU 2 leach tests will be used for the following purposes:

- To provide source-term concentrations for organic contaminants of interest.
- To provide inorganic input data for geochemical modeling. This modeling will account for precipitation/dissolution reactions, when fate-and-transport scenarios include glacial overburden in the flow path.
- To provide source-term concentrations for radionuclides and metals of interest, when fate-and-transport scenarios do not include glacial overburden in the flow path.

Leachate produced during laboratory leaching of OU 2 waste material will be analyzed for the chemical constituents listed in Attachment 1. General chemical parameters, such as pH, Eh, bicarbonate, and sulfate are necessary to characterize the leachate for geochemical modeling. The leachate will also be analyzed for total organic carbon to determine if potential organic complexing agents are present.

Petrographic and x-ray diffraction analysis of glacial overburden samples is currently underway. Results of this study will be combined with concentrations derived from the SRLP to model precipitation/dissolution reactions in the glacial overburden.

4.0 DATA QUALITY OBJECTIVES

The data objectives presented in Section 3.0 dictate that the analytical data generated by the OU 2 laboratory leach tests be of high quality. The data quality objectives define, document, and ensure the quality of analytical results obtained from the SRLP.

4.1 MODIFIED TCLP LEACHING PROCEDURE

Quality assurance requirements are identical to those established in the TCLP protocol. Additionally, a minimum of one SRLP will be run in duplicate for every ten SRLP tests performed. The SRLP duplicate will be run on a split of the composited waste and the analytes must agree with the original SRLP results within two times the established analytical uncertainty for the analyte, e.g., for calcium the analytical uncertainty is ± 20 percent, therefore the duplicate and original must agree within ± 40 percent.

A minimum of one laboratory calibration blank and one method blank will be analyzed for every ten SRLP tests performed. The laboratory calibration blanks will demonstrate that the simulated rainwater used in the SRLP does not contain detectable concentrations of the analytes of interest. The method blanks will test for contamination due to sample manipulation, i.e., sieving and filtering, and contact with laboratory apparatus.

4.2 INORGANIC, ORGANIC, AND RADIOLOGICAL ANALYSIS OF EXTRACTANT

Data quality objectives for the analysis of extractants generated by the SRLP will be identical to those listed in Tables 4-2 and 4-3 of the FMPC RI/FS Quality Assurance Project Plan (QAPP; ASI/TT, 1988). These tables establish the precision, accuracy, and completeness for all parameters listed in Attachment 1, except general chemistry and metals. Table 4-1 of the FMPC RI/FS QAPP gives the precision and accuracy for general chemistry and metals but the listed values should read ± 20 percent for precision and ± 25 percent for accuracy. Also

included in Tables 4-1 through 4-3 of the QAPP are analytical method references and method detection limits. Detection limits reported for leachate will be identical to those for water samples listed in the analytical contract for the FMPC RI/FS, i.e., contract-required quantitation limits (CRQLs).

Ten percent of the total number of samples will be analyzed in duplicate and spiked to evaluate recovery in accordance with laboratory quality control (QC) procedures.

Metals and organic data will be analyzed and reported in accordance with EPA Contract Laboratory Program (CLP) protocols (EPA, 1988a and 1988b). Radionuclides will be analyzed and reported in accordance with the IT/Radiological Sciences Laboratory Radioanalytical Methodology and Procedures Manual and the IT/Radiological Sciences Laboratory QA Manual. General chemical parameters will be analyzed and reported in accordance with the IT Analytical Services QA Manual.

5.0 SIMULATED RAINWATER LEACHING PROCEDURE

The Simulated Rainwater Leaching Procedure (SRLP) is a modification of the Toxicity Characteristic Leaching Procedure (TCLP; 40 CFR 261, Appendix II, Method 1311) promulgated by the EPA on March 29, 1990. However, the SRLP is intended to be used for source-term characterization of leachate and is not a substitute for the TCLP that is designed for waste characterization.

5.1 SUMMARY OF METHOD

The particle size of the solid waste is evaluated and reduced if necessary. Organic and inorganic contaminants of interest are leached with an amount of fluid equal to 20 times the weight of the sample, i.e., 2 liters of simulated rainwater per 100 grams of solid. Testing for volatile and semivolatile organic compounds is carried out according to the TCLP method with simulated rainwater as the extraction fluid. For inorganic testing, simulated rainwater is used and the TCLP method is followed, but the extraction fluid is serially sampled every 3 days until steady-state concentrations have been obtained for hazardous metals and gamma-

emitting radionuclides or a maximum of three sample rounds have been conducted. Prior to analysis of the leachate, the fluid is separated from the solid with a 0.6 to 0.8 micron glass filter.

5.2 ANALYTE INTERFERENCES

Potential interferences that may be encountered during analysis are discussed in the approved analytical methods.

5.3 APPARATUS AND MATERIALS

Laboratory apparatus and materials are identical or equivalent to those described in the TCLP. In addition to the TCLP laboratory hardware, a reservoir tank with a 50-liter capacity and a pump capable of sustaining a minimum air flow of 500 cubic centimeters per minute are required.

5.4 REAGENTS

5.4.1 Simulated Rainwater

Simulated rainwater, i.e., the leaching solution, is defined as ASTM Type II water (ASTM, 1988) or equivalent that has been equilibrated with atmospheric CO₂ at room temperature (22 ± 3 °C) by bubbling air through the reservoir tank until a pH of 5.7 ± 0.1 is achieved. As discussed in Section 4.1, samples of the simulated rainwater will be analyzed to demonstrate that the analytes of interest are below the detection limit of the approved analytical method.

5.4.2 Analytical Standards

Analytical standards will be prepared in accordance with the approved analytical method.

5.5 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

All samples will be collected using the procedures outlined in the FMPC RI/FS QAPP. Samples collected for volatile organic compound (VOC) testing will be obtained from discrete intervals and must not be composited. Waste recovered from field borings for non-VOC testing will be composited to obtain a minimum sample weight of 1 kilogram. Preservation

and handling of VOC and non-VOC samples will follow the TCLP protocol.

5.6 PRELIMINARY EVALUATIONS

Preliminary evaluation of the waste may be required to determine if particle-size reduction is needed or if in situ leachate can be recovered. Particle-size reduction is required if the waste solids will not pass through a 9.5 mm teflon sieve. If a sufficient volume, approximately six liters, of in situ leachate can be recovered from the waste, the SRLP will not be required.

5.7 NONVOLATILE COMPOUND PROCEDURE

A minimum sample size of 100 grams per extraction is required. The waste is placed in the extraction vessel with 2 liters of simulated rainwater. Additional extractions can be run in parallel if 2 liters of extract is not sufficient volume for the required analyses. Close the extraction vessel and apply Teflon tape to ensure a tight seal. Secure the vessel in a rotary agitation device and rotate at 30 ± 2 rpm for 3 days. Ambient temperature shall be maintained at 22 ± 3 °C during the extraction period.

After 3 days, centrifuge the slurry and remove 50 ml of the supernatant for analysis of gamma-emitting radionuclides and hazardous metals. Secure the vessel, restart the sample agitation and continue to agitate the sample for an additional 3 days. Repeat the sampling and analysis as indicated above. If the analytical results from the two sets of screening analyses are within the analytical uncertainty of the approved method, that is the contaminant concentrations have obtained their steady-state values, the sample is filtered through a 0.6 to 0.8 micron glass filter and analyzed for all constituents in Attachment I, including pH and Eh. If the analytical results do not agree within the established uncertainty, secure the vessel and agitate the sample for a final 3 day period. At the end of the final 3-day period, filter and analyze the sample for pH, Eh, and all constituents in Attachment I as indicated above.

Due to budget limitations, a maximum of three sample rounds per SRLP test will be used to establish the concentration of contaminants in the leachate. The contaminant concentrations may or may not reach steady-state values over the 9-day period of the SRLP test. If steady-

state conditions are not obtained over the 9-day period of leaching, the analysis obtained from the final sampling round will be considered to be representative of the waste leachate.

5.8 VOLATILE AND SEMIVOLATILE ORGANIC COMPOUND PROCEDURE

The procedure for VOC and semi-VOC samples is identical to the TCLP protocol with the exception of the leaching fluid. Extraction of VOCs and semi-VOCs for source-term characterization is carried out with simulated rainwater. Tributyl phosphate is analyzed with the semi-VOC suite of compounds.

6.0 NUMBER OF SAMPLES

Operable Unit 2 waste units include the sanitary landfill, inactive and active fly-ash piles, north and south lime sludge ponds, and southfield area. The additional sampling activity plan for OU2 proposes one sample of in situ leachate or SRLP for the sanitary landfill, lime sludge ponds, and inactive and active fly-ash piles. Therefore, the maximum number of SRLP samples is five and the minimum is zero if all waste units yield in situ leachate.

7.0 REFERENCES

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Attachment 1 Analytical Parameters for Leachate Characterization by SRLP

GENERAL CHEMISTRY	METALS	RADIONUCLIDES	ORGANIC COMPOUNDS
alkalinity	Ag, Al	¹³⁷ Cs	TCL ^a VOCs
Cl ⁻	As, Ba	²³⁷ Np	TCL semi-VOCs
Eh	Be, Ca	²³⁸ Pu	TCL pesticides
F ⁻	Cd, Co	^{239,240} Pu	TCL PCBs
NH ₄ ⁺	Cr, Cu	²²⁶ Ra	TBP ^b
NO ₃ ⁻	Fe, Hg	²²⁸ Ra	
pH	K, Mg	¹⁰⁶ Ru	
PO ₄ ⁻³	Mo, Mn	⁹⁰ Sr	
SO ₄ ⁻²	Na, Ni	⁹⁹ Tc	
TOC	Pb, Sb	Th-total	
	Se, Si	U-total	
	Tl, V		
	Zn		

^a TCL = Target Compound List. The specific organic compounds are listed in the CLP Statement of Work for Organics (EPA, 1988b).

^b TBP = Tributyl phosphate is analyzed as part of the semi-VOC suite.

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